

## Probiotic use in acute viral gastroenteritis: Is it really effective?

Probiotic use in acute viral gastroenteritis

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### Abstract

**Aim:** Acute diarrhea in childhood is the second most common cause of high morbidity and mortality and occurs mostly due to viral agents. The aim of this study is to determine the effect of probiotics on the severity and duration of the complaints of children aged between 2 and 5 years who were treated in our clinic with the diagnosis of acute viral gastroenteritis in early childhood morbidity and mortality. **Material and Method:** Children aged between 2 and 5 years who were hospitalized in the Pediatric Clinic with acute viral gastroenteritis between October 2017 and October 2018 were included in the study. The patients were divided into groups of those taking probiotic treatment (Group 1) and not taking probiotic treatment (Group 2). **Results:** Total of 316 stool samples were examined and viral agents were determined in 125 patients (39.55%). **Discussion:** Especially in the treatment of diarrhea related to viral gastroenteritis, it was found that probiotics could reduce the mean duration of diarrhea until one day independently of the strain and also significantly decrease the number of watery diarrhea.

### Keywords

Acute Diarrhea; Adenovirus; Rotavirus

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Introduction

Acute diarrhea in childhood is the second most common cause of high morbidity and mortality and occurs mostly due to viral agents [1-4]. The most common viral agents are the association of rotavirus, adenovirus, and rotavirus-adenovirus [5-6]. Viral agents, unlike other microbial agents, cause bloodless, mucous, and abundant watery diarrhea [4,6-8]. It can be seen in all ages in early childhood but is more common in cold months [1,2,9]. In the literature, approximately half a million children under 5 years of age are reported to die due to acute viral gastroenteritis. Death is mostly due to severe fluid electrolyte losses because of late diagnosis and inadequate treatment. The key point in preventing morbidity and mortality is to prevent the loss of fluid-electrolyte or make timely diagnosis and timely treatment [1,4,7,9,10]. Otherwise, death from hypovolemic shock is inevitable. Studies have reported that probiotics have positive effects on the progression of acute diarrhea, although antibiotics have no place in the treatment of viral agents. Probiotics are live digestive system bacteria that provide health benefits to the host. They may inhibit the localization of pathogenic bacteria by colonizing bowel epithelium [3,10-14]. Probiotics can be effective in the treatment and prevention of gastroenteritis. Several randomized controlled trials and meta-analyses suggest that probiotics are effective in primary and secondary prevention and treatment of gastroenteritis. The active probiotic dose should be given during 7-15 days period and total 5x10<sup>9</sup>/day in acute viral gastroenteritis. Probiotics especially Bifidobacterium Lactis and Saccaromyces spp or their combination forms are found effective in acute viral gastroenteritis. In the literature, it is reported that using of probiotics benefits both inpatient and outpatient in acute viral diarrhea [2, 10-15].

The aim of this study is to determine the effect of probiotics on the severity and duration of the complaints in children aged between 2 and 5 years who were treated in our clinic with the diagnosis of acute viral gastroenteritis in early childhood morbidity and mortality.

Material and Method

Children aged between 2 and 5 years who were hospitalized in the Pediatric Clinic with acute viral gastroenteritis between October 2017 and October 2018 were included in the study. Patients with bloody stools and microbial agents other than viruses and children under 2 years of age and over 5 years and with immunodeficiency were excluded from the study.

All samples were examined for bacterial agents and parasites by appropriate methods.

The diagnosis was made by virus detection of fresh stool samples with the qualitative immunochromatographic assay (Rota / Adenovirus Rapid Test Card, GenxBio, India).

The patients were divided into groups of those taking probiotic treatment (Group 1) and not taking probiotic treatment (Group 2). Probiotic solution (Bifidobacterium spp Probiotic, Maflor, Mamsel) was added to Group 1. The active probiotic dose given was total 5x10<sup>9</sup> twice a day and 7-15 days period [15-17].

The demographic and clinical findings of the patients were analyzed retrospectively.

These findings were compared between Group-1 and Group-2.

Statistical analysis

SPSS 20.0 statistical package program was used for statistical evaluation. Chi-Square test was used to compare the categorical variables of the groups. Student Whits t- test was used for homogeneous distribution of data and Mann - Whitney U test was used for non-homogeneous distributions. P <0.05 was considered significant.

Results

The data of pediatric patients aged between 24 and 60 months who were diagnosed with acute gastroenteritis were evaluated. Total of 316 stool samples were examined and viral agents were determined in 125 patients (39.55%). Only one viral pathogen was determined in 104 (83.2%) of the total viral gastroenteritis. Rotavirus was detected in 81(64.8%) of these patients and adenovirus was detected in 23 (18.4%) of these patients. Adenovirus and rotavirus co-infection were found in 21 (16.8%) of the total viral gastroenteritis (Table 1).

The average age of the patients was 3.98 years. N = 66, 52.8% of total viral gastroenteritis were female and 47.2% (n: 59) of these patients were male. In our study, the most frequent rate of rotavirus positivity was detected in November, December and March, whereas adenovirus positivity was most frequent in November, January and February. The clinical findings of the patients were fever, vomiting, severe diarrhea and dehydration (Table 2).

The mean number of diarrhea patients in group-1 was 4.6 / day. The mean number of diarrhea in group-2 patients was 8.1 / day (p <0.05).

The mean duration of hospital stay in Group 1 patients was 3.8 (3-7 days) days. The mean duration of hospital stay in Group 2 patients was 6.1 (5-9 days) days (p <0.05) (Table 3).

Table 1. Etiology of acute diarrhea

Etiologic Agent	n	%
Virus	125	39.55
Rotavirus	81	64.8
Adenovirus	23	18.40
Rota-adeno virus*	21	16.8
Others**	191	60.45

\*Rotavirus and adenovirus coexisting

\*\* Bacterial, parasitic, and antibiotics associated acute diarrhea

Table 3. Comparison of number of diarrhea and hospitalization time between groups.

	Group 1	Group 2	P
The mean number of diarrhea/day	4.6	8.1	P<0.05
The mean duration of hospital stay (day)	3.8	6.1	P<0.05

Discussion

Acute gastroenteritis is an important cause of morbidity in developed countries and is the most common cause of death in developing countries after respiratory infections [2, 4, 5, 10, 18]. Acute gastroenteritis which causes the death of millions children every year, is often a viral infectious disease [1, 7- 8, 19]. The disease that causes severe fluid electrolyte losses due to vomiting and diarrhea lead to important rate admissions to

hospital. The disease leads to important rate increase in hospital admissions. The disease that causes severe fluid electrolyte losses due to vomiting and diarrhea leads to important rate and Rotaviruses and adenoviruses are common in the etiology of viral gastroenteritis. The frequency of rotavirus was found to be 54-71% and adenovirus frequency was 1.57-23.6% and adeno-rotavirus association was found to be 1.07-10.6% in different studies [1, 4-6, 8-11, 18,19]. In our study, only one viral pathogen was determined in 104 (83.2%) of the total viral gastroenteritis. Rotavirus was detected in 81 (64.8%) of these patients and adenovirus was detected in 23 (18.4%) of these patients. Adenovirus and rotavirus co-infection were found in 21 (16.8%) of the total viral gastroenteritis.

Although acute viral gastroenteritis can occur in every season of the year, commonly in autumn, winter and spring months [3, 4, 6-8]. In our study, the most frequent rate of rotavirus positivity was detected in November, December, and March, whereas adenovirus positivity was most frequent in November, January, and February. Viral gastroenteritis agents are highly resistant to the external environment and can survive for months [2-5, 16, 18]. In early childhood, children try to explore their environment. Especially in this period, the frequency of viral gastroenteritis is high since they take everything in their mouths. These agents may lead to dramatic fluid electrolyte losses within hours, although they may result in nonspecific clinical findings (fever, nausea, vomiting, diarrhea) after 1-3 days of incubation [1-4, 7, 10, 19]. In this study, 100% (n: 125) malaise, 100% (n: 125) abundant watery diarrhea, 90.4% (n: 113) vomiting and 85.6% (n: 107) of the patients were presented. These data have shown that the clinical course of acute diarrhea due to viral agents can dramatically disrupt. In the literature, the frequency of viral agents in children with acute diarrhea has been reported to be similar between genders [1, 9, 16, 17]. N = 66, 52.8% of total viral gastroenteritis were female and 47.2% (n: 59) of these patients were male. In our study, there was no statistically significant difference between gender in terms of frequency of viral gastroenteritis agents ( $p > 0.05$ ).

Intestinal mucosal flora deterioration due to Viral gastroenteritis increases the tendency for all infections. This situation is also a serious cause of childhood complications due to gastroenteritis. Regardless of the pathogen responsible for the etiology, the most important step in the treatment of acute diarrhea is to prevent fluid loss and electrolyte imbalance and to replace it if necessary. There is no ideal drug for diarrhea and treatment is usually symptomatic [4, 9, 16-19]. Probiotics are defined as microbial agents that provide beneficial effects on human health when used in appropriate doses. Probiotics show their effects by inhibiting the binding and proliferation of pathogenic bacteria to the mucosa epithelium, by improving the intestinal barrier functions, and by regulating the immune system. In recent years, an increasing number of studies have recommended prophylactic use of probiotics in the treatment of viral enteritis. It has been reported in the literature that the addition of probiotics to the management of acute gastroenteritis provides a significant improvement in disease duration and severity [3, 4, 10, 11, 18-20]. Probiotics have been studied for the prevention and treatment of pediatric infectious diseases, especially upper respiratory tract infections, acute gastroenteritis, and

antibiotic-associated diarrhea. And these studies have been shown to be particularly useful in the treatment of acute viral gastroenteritis [3, 10-13, 15, 19, 21]. Although there have been many clinical studies on the probiotics in the prevention and treatment of acute diarrhea, the type, dose, and duration of the probiotics used in these studies differ [11, 12, 19, 20-24]. The efficacy of the majority of probiotics used in the prevention and treatment of childhood diarrhea varies depending on the strain and dose. The probiotic strains mostly used in the studies are *Lactobacillus* species, *Bifidobacterium* species and *Saccharomyces boulardii* [3, 4, 11-15, 18-24]. Especially in the treatment of diarrhea related to viral gastroenteritis, it was found that probiotics could reduce the mean duration of diarrhea until one day independently of the strain and also significantly decrease the number of watery diarrhea at first 48 hours. Similarly, in our study, the clinical course of the patients in Group-1 improved significantly compared to Group 2. In the light of these data, we think that probiotic use is beneficial from the early period in children with acute viral gastroenteritis.

In conclusion, this study supports that viral agents are the most common cause of acute gastroenteritis in an early childhood age and can be reason for serious clinical course and also have beneficial effects of probiotics similar to the literature.

The lack of the placebo group and data of long-term results after discharge are the limitation of this article.

#### Scientific Responsibility Statement

*The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.*

#### Animal and human rights statement

*All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.*

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#### Conflict of interest

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